PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 27 March 2001 (27.03.01)	
International application No. PCT/GB00/02608	**Applicant's or agent's file reference**
International filing date (day/month/year) 07 July 2000 (07.07.00)	**Priority date** (day/month/year) 24 July 1999 (24.07.99)
Applicant INSLEY, Bryan	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

23 January 2001 (23.01.01)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer S. Mafla
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 00/ 02608	07/07/2000	24/07/1999
Applicant		
UNI-LITE INTERNATIONAL LIMITED		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of Invention is lacking** (see Box II).

4. With regard to the **title,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 5

   [ ] as suggested by the applicant.

   [X] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 00/02608

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

The abstract is changed as follows:

Line 6, after "cavity" insert "(33)".

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/02608

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01M10/46

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 191 917 A (BROWN WAYNE R ET AL) 4 March 1980 (1980-03-04) claims 1-8; figures 1-6	1-6,10
X	GB 948 191 A (H. DUMER) 24 February 1965 (1965-02-24) claims 1-7; figure 2	1,2,10, 15
X	FR 2 520 939 A (JOUSTRA SA) 5 August 1983 (1983-08-05) page 5, line 1 - line 23; claims 1-11; figures 1,3	1-8,15
A	US 5 449 567 A (YEH TSUN-WAN) 12 September 1995 (1995-09-12) cited in the application claims 1-19	1-17

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 October 2000	24/10/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Battistig, M

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Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 086 523 A (IZUMI KOJI) 25 April 1978 (1978-04-25) cited in the application claims 1-12	1-17

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 00/02608

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4191917 A	04-03-1980	DE 2836907 A	29-03-1979
		FR 2401531 A	23-03-1979
		SE 438755 B	29-04-1985
		SE 7808743 A	11-08-1979
GB 948191 A		DE 1167014 B	
		FR 1329130 A	16-12-1963
		NL 279495 A	
FR 2520939 A	05-08-1983	NONE	
US 5449567 A	12-09-1995	NONE	
US 4086523 A	25-04-1978	NONE	

INTERNATIONAL SEARCH REPORT

Inte ional Application No
PCT/GB 00/02608

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IPC 7 H01M10/46

According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

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X	CH 389 700 A (H. DUMER) 15 July 1965 (1965-07-15) claims 1-7; figure 2 ---	1,2,10, 15
X	FR 2 520 939 A (JOUSTRA SA) 5 August 1983 (1983-08-05) page 5, line 1 - line 23; claims 1-11; figures 1,3 ---	1-8,15
A	US 5 449 567 A (YEH TSUN-WAN) 12 September 1995 (1995-09-12) cited in the application claims 1-19 --- -/--	1-17

[X] Further documents are listed in the continuation of box C.

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 November 2000	01.12.00

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Battistig, M

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Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 086 523 A (IZUMI KOJI) 25 April 1978 (1978-04-25) cited in the application claims 1-12 -----	1-17

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte ional Application No
PCT/GB 00/02608

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4191917 A	04-03-1980	DE 2836907 A	29-03-1979
		FR 2401531 A	23-03-1979
		SE 438755 B	29-04-1985
		SE 7808743 A	11-08-1979
CH 389700 A	31-03-1965	NONE	
FR 2520939 A	05-08-1983	NONE	
US 5449567 A	12-09-1995	NONE	
US 4086523 A	25-04-1978	NONE	

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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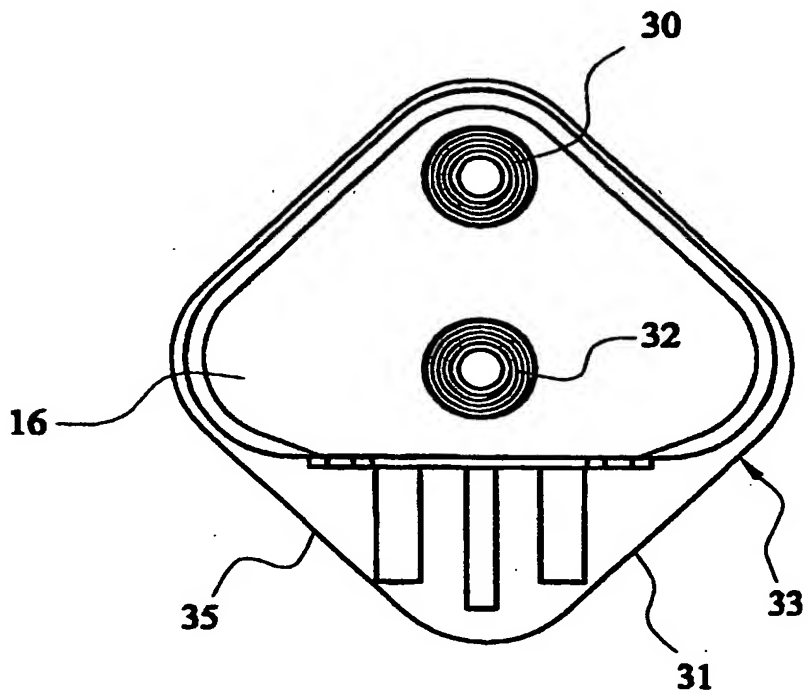
Published:
— *With international search report.*
— *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

[Continued on next page]

(54) Title: AN INTEGRAL BATTERY AND RECHARGER



(57) Abstract: An integral battery and recharger is described. The battery includes a battery housing, battery terminals and plug pins for location in a plug socket and operable to effect recharging of the battery when connected to an AC supply. The battery housing is generally designed to be received in a close fitting cavity (33) of a battery powered device. The part of the housing from which the plug pins project is designed to be sufficiently spaced, in use, from the walls of the cavity to allow the plug pins which project therefrom to fully extend in the space provided between the part and the cavity. Preferably, the side from which the pins project extends at substantially 45° with respect to the said adjacent sides to form the third side of a three sided battery housing. A method of using and recharging a battery located in a battery powered device is also described.

WO 01/08249 A1

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

AN INTEGRAL BATTERY AND RECHARGER

The present invention relates to an integral battery and recharger device.

Rechargeable battery devices are well known for two prong plug sockets used in many countries. For instance, US 4,086,523 describes a rechargeable battery device including a storage cell, a housing enclosing the storage cell, a rectifier in the housing and a pair of output terminals exposed for delivering electrical energy from the storage cell. The battery is provided with a pair of prongs arranged for electrical connection to a female power supply receptacle. The prongs are pivotally mounted at opposite sides of one of the terminals to extend selectively in a first disposition straddling one end of the housing, and a second disposition projecting from that one end in a parallel spaced relationship to be received in the female power receptacle. The electrical circuit of the rechargeable battery includes a switch for electrically connecting the prongs to the rectifier and storage cell to permit recharging of the storage cell from the female power supply receptacle only when the prongs are disposed in the extended disposition. The prongs may be biased both to the retracted disposition and the extended disposition, and at least one of the contacts may be a spring contact for effectively maintaining electrical connection between the prongs and the charging circuitry. One of the contacts of the switches may be defined by a portion of the prongs. Similarly, US 5,449,567 describes a rechargeable battery including a hollow battery housing having a top end

provided with a positive battery terminal, a bottom end provided with a negative battery terminal and a surrounding wall that confines a cell receiving space and a prong receiving space. A prong unit including a prong base disposed slidably in the prong receiving space, a pair of prongs connected at one end to the prong base, and a slide button extending through a longitudinal slot in the surrounding wall of the battery housing and connected to the prong base. The slide button is operable manually to move the prongs selectively between a first position, wherein the prongs are fully retracted in the prong receiving space, and a second position, wherein the prongs extend out of the prong receiving space via prong holes at the top end of the battery housing for connection to an electrical outlet.

These publications typify the prior art in this area which addresses the problem of how to remove the integral prongs after recharging is complete so that the device may once again be used as a battery.

According to a first aspect of the present invention there is provided an integral battery and recharger comprising a battery housing, battery terminals and plug pins for location in a plug socket and operable to effect recharging of the battery when connected to an AC supply, the battery housing being generally designed to be received in a close fitting cavity of a battery powered device, wherein the part of the housing from which the plug pins project is designed to be sufficiently spaced, in use, from the walls of the said cavity to allow the

plug pins which project therefrom to fully extend in the space provided between the said part and the said cavity.

The housing may be shaped so as to be securely locatable in the cavity in a manner which is independent of the pins. Alternatively, the ends of the pins may extend, in use, as far as the cavity and contribute to the stability of the unit in the cavity.

Preferably, the ends of the pins provide two point, more preferably, three point stabilising contact, in use, with the cavity without causing, or preferably, allowing the battery to be moved out of position within the cavity.

Preferably, the plug pins project outwardly from a side of the housing and, preferably, are fixed in the same position with respect to the housing during recharging and during use of the battery in a battery powered device.

Preferably, the battery is designed for location in a generally four-sided cross-section elongate cavity, preferably, a rectangular cross-section with bevelled angles.

The prior art battery housing for such prior art cavities would commonly also be a generally rectangular, bevelled angled, cross-section elongate battery housing for close fitting engagement with the battery cavity. However, in a preferred embodiment of the invention a corner of such a prior art housing would be cut-away to provide a generally flat face, preferably, longitudinally parallel with the

remaining sides of the housing, preferably, disposed approximately 45° thereto. The plug pins may be fitted to project outwardly from this face of the housing and the depth of imaginary cut-off of the corner is that required for the pins to fully extend, in use as a battery, without projecting beyond the cavity walls.

Preferably, therefore, the housing has three sides in end section.

In preferred embodiments, the corners between sides of the housing are bevelled.

The bevelled edges are, preferably, of sufficient radius and arc length to stabilise the three-sided housing against rotation in a four sided cavity.

Preferably, the plug pins project outwardly perpendicular from the cavity spaced face of the housing.

Preferably, the battery housing has a top face from which at least one, preferably two, battery terminal(s) project(s) and a bottom face from which battery terminals may also project.

The pins may be of a three pin or two pin construction. Preferably, the positive and negative pins abut, in use, adjacent sides of the cavity respectively to thereby provide additional rotational and lateral stability for the battery within the cavity.

When used, the earth pin, preferably, extends towards and may abut, in use, a corner of the cavity between adjacent sides thereof. In such a manner the earth pin may also provide additional rotational and lateral stability for the battery in the cavity.

Preferably, two adjacent sides of the battery housing extend substantially at right angles to each other. Preferably, the side from which the pins project extends at substantially 45° with respect to the said adjacent sides to form the third side of a three sided battery housing, preferably, suitable for location in a four sided cavity of a battery powered device, preferably, in such a manner that there is sufficient space between the cavity spaced side and the cavity walls to allow two-pin or three pin plug pins to fully extend therefrom without extending beyond the walls of the cavity.

According to a second aspect of the present invention there is provided a battery powered device comprising a battery cavity for receiving a battery housing and a battery located in the said cavity, the battery being according to the first aspect of the present invention. Preferably, the cavity is an elongate rectilinear construction to accommodate the said battery, preferably, the cavity is four sided. Preferably, the angles between the sides of the cavity are bevelled.

The second aspect of the invention may incorporate any one or more of the preferred features of the first aspect of

the invention except where such features are mutually exclusive.

Advantageously, the battery design is such as to minimise loss of battery housing volume whilst maintaining rotational lateral and rocking stability for the battery within the battery cavity. A further advantage is the use of the pin ends to further stabilise the battery in the same manner. A still further advantage is provided during recharging because the pins project from the side of the battery housing as opposed to the ends of an elongate battery and the battery housing is thus more compact with respect to the wall and socket, preventing inadvertent dislodgement of the battery or failure to be able to utilise the battery in limited space locations.

The interior of the battery itself is, typically, of a common construction and is adapted to be interchangeable with a conventional dry cell battery comprising a housing containing therein storage cell means, charging means connected to said storage cell means and socket pins connecting, in use, said charging means to a power source socket.

Preferably, the pins are fixed and permanently extend from the said side of the device.

According to a third aspect of the present invention there is provided a method of using and recharging a battery located in a battery powered device comprising the steps of:-

using the said battery powered device in battery powered mode;

removing the battery having integral plug pins projecting therefrom from the battery powered device;

and plugging the said plug pins into a power source socket for recharging the said battery wherein the position of the plug pins are continuously fixed in the same position with respect to the battery housing during the aforementioned steps.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:-

Figure 1 shows a perspective view of a battery in accordance with the present invention;

Figure 2 shows a side elevation of the battery of figure 1;

Figure 3 shows a rear elevation of the battery of figure 1;

Figure 4 shows an underplan view of the battery of figure 1;

Figure 5 shows a plan view of the battery of figure 1; and

Figure 6 shows a suitable circuitry for recharging.

Referring to figures 1-5, a battery housing 2 comprises two perpendicular adjacent elongate sides 4, 6; a third side 8 extending at 45° to the said adjacent sides 4,6; bevelled edges 10-14 between each adjacent sides 4, 6 and 8; a top plate 16; and a bottom plate 18. The battery is designed to be located in a bevelled angled rectangular

end-section elongate cavity of a battery powered device. The cavity having sides equivalent in width to adjacent sides 4, 6 and of corresponding height to the battery housing 2. The battery housing 2 is located in the rectangular bevelled angled section elongate housing in such a manner that the adjacent sides 4, 6 are located against two adjacent sides of the cavity and the bevelled edges 10, 12, 14 are located against corresponding bevelled angles in the cavity. In this manner, the third side 8 of the housing 2 is substantially spaced from the remaining bevelled angle of the cavity.

A 3 pin plug plate 20 resides in a recessed area 22 formed in the third side 8 of the battery housing 2 in such a manner that the pins of the plate project outwardly therefrom perpendicular to the surface of the third side 8. The plug plate 20 is centrally located in the third side 8 of the battery housing 2 in such a manner that the positive terminal 24 and the negative terminal 26 project outwardly from a height midway between the top and bottom of the side 8 and the earth pin 28 located above the positive and negative pins projects outwardly midway between the side edges of the third plate 8. In use, the cavity spaced side 8 of the housing 2 is sufficiently spaced, in use, from the sides of the cavity to allow each of the pins 24, 26, 28 to fully extend into the space without extending beyond the walls of the cavity. In the embodiment shown, the pins extend as far as the walls of the cavity to provide , in use, three point stabilising contact with the walls of the cavity. Positive and negative pins 24, 26 each abut against adjacent sides of

the cavity respectively and the end of the earth pin 28 abuts against the fourth bevelled edge of the cavity.

The top plate 16 of the battery housing 2 has two spring terminals 30, 32 extending upwardly therefrom corresponding to the positive and negative terminals of the battery. In use as a battery, the unit is located within a bevelled angled rectangular section elongate cavity of a battery powered device (33) and a cap is generally fitted onto the device with corresponding circuit contacts matching the position of the terminals 30, 32 so that battery powered action of the device may take place. The bevelled edges of the battery housing together with the ends of the plug pins provide stable positioning of the battery within the housing. As can be seen from Figure 5, the positive and negative plug pins may abut the walls 31, 35 of the cavity 33 to provide stability and a unique battery locating design.

Once the life of the battery has expired, the battery may be removed from the cavity and plugged into a suitable power source wall socket for recharging. After recharging of the device, the unit may once again be used as a battery.

The invention thus provides a very convenient integral recharging unit which does not require capping of the pins during use as a battery or folding away or relocation of the pins during battery use. Accordingly, the battery may be immediately used for recharging without the necessity to adjust any components of the battery.

Although the battery housing may be used without the requirement of a cap to cover the pins, it is envisaged that a capped version of the battery may be utilised in two ways. The negative and positive terminals of the battery could be capped during recharging so that they are isolated and a suitable sized cap would be obvious to those skilled in the art. Furthermore, a cap may be located over the plug pins and this cap may, optionally, provide a rectangular bevelled edge section, elongate shape for the housing. In this manner of use, the ends of the three pin or two pin plug pins may stabilise the cap in position so that the cap, in turn, stabilises the battery housing in position in the cavity.

Although a three pin plug has been described it would be apparent that the invention may also be utilised for a two pin plug although such would provide less stability with only two point instead of three point contact.

Within the housing of the integral recharger, is located suitable recharging circuitry as described with reference to figure 6 below.

Suitable recharging circuitry will be known to those skilled in the art. US 5,449,567 describes suitable recharging circuitry for an integrated battery and recharger and figures 3-10 of this patent are incorporated herein by references as examples of suitable recharging circuitry.

Simple recharging circuitry is also defined in US patent no. 4,086,523, figure 5. Referring to figure 6, a suitable two-pin recharging circuit is shown where the negative and positive prongs 2, 4 are connected by suitable contacts 6,8 and wires 10, 12 to opposite ends 14, 16 of the transformer primary winding 18. A secondary transformer winding 20 is connected with a rectifier 22 to terminal 24 of storage cell 26 and a centre connection 28 is connected from the transformer secondary winding 20 to the terminal 30 of storage cell 26. The other end of the secondary winding 20 is connected with rectifier 32 to storage cell terminal 24. Accordingly in use, an AC current is provided to the transformer primary winding and the transformer reduces the voltage supply to provide a suitable charging voltage to the battery cell via the rectifiers 22, 32 which provide a full wave rectification of the alternating current power supply.

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extend to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS

1. An integral battery and recharger comprising a battery housing, battery terminals and plug pins for location in a plug socket and operable to effect recharging of the battery when connected to an AC supply, the battery housing being generally designed to be received in a close fitting cavity of a battery powered device, wherein the part of the housing from which the plug pins project is designed to be sufficiently spaced, in use, from the walls of the said cavity to allow the plug pins which project therefrom to fully extend in the space provided between the said part and the said cavity.
2. An integral battery and recharger according to claim 1, wherein the housing is shaped so as to be securely locatable in the cavity in a manner which is independent of the pins.
3. An integral battery and recharger according to claim 1, wherein the ends of the pins extend, in use, as far as the cavity and contribute to the stability of the unit in the cavity.
4. An integral battery and recharger according to any preceding claim, wherein the ends of the pins provide two point stabilising contact, in use, with the cavity.
5. An integral battery and recharger according to any preceding claim, wherein the plug pins project outwardly from a side of the housing.
6. An integral battery and recharger according to any preceding claim, wherein the plug pins are fixed in

the same position with respect to the housing during recharging and during use of the battery in a battery powered device.

7. An integral battery and recharger according to any preceding claim, wherein the battery is designed for location in a generally four-sided cross-section elongate cavity.

8. An integral battery and recharger according to claim 7, wherein the cavity has a rectangular cross-section with bevelled angles.

9. An integral battery and recharger according to any preceding claim, wherein the housing has three sides in end section.

10. An integral battery and recharger according to any preceding claim, wherein the plug pins project outwardly perpendicular from the cavity spaced face of the housing.

11. An integral battery and recharger according to any preceding claim, wherein the positive and negative pins abut, in use, adjacent sides of the cavity respectively to thereby provide additional rotational and lateral stability for the battery within the cavity.

12. An integral battery and recharger according to any preceding claim, wherein two adjacent sides of the battery housing extend substantially at right angles to each other.

13. An integral battery and recharger according to claim 12, wherein the side from which the pins project extends at substantially 45° with respect to the said

adjacent sides to form the third side of a three sided battery housing.

14. A battery powered device comprising a battery cavity for receiving a battery housing and a battery located in the said cavity, the battery being according to any of claims 1-13.

15. A method of using and recharging a battery located in a battery powered device comprising the steps of
using the said battery powered device in battery powered mode;
removing the battery having integral plug pins projecting therefrom from the battery powered device;
and plugging the said plug pins into a power source socket for recharging the said battery wherein the position of the plug pins are continuously fixed in the same position with respect to the battery housing during the aforementioned steps.

16. A battery and recharger as hereinbefore described with reference to the accompanying drawings.

17. A method of using and recharging a battery as hereinbefore described.

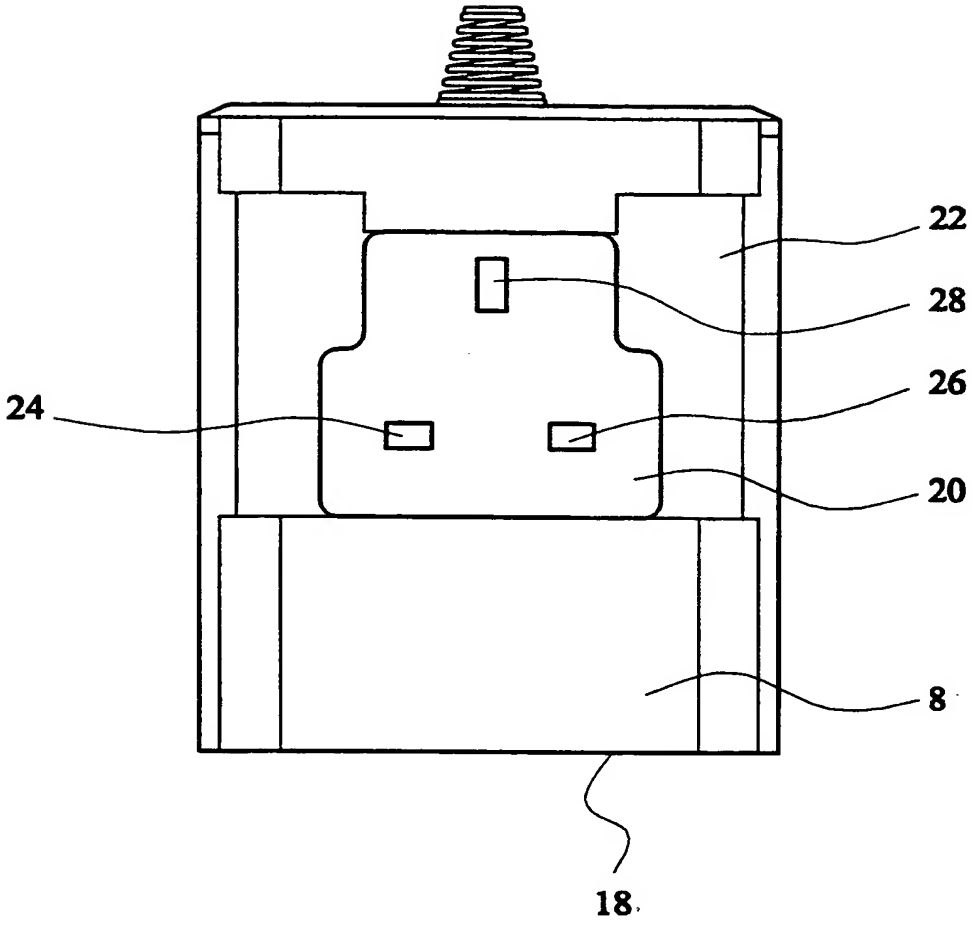


FIG. 1

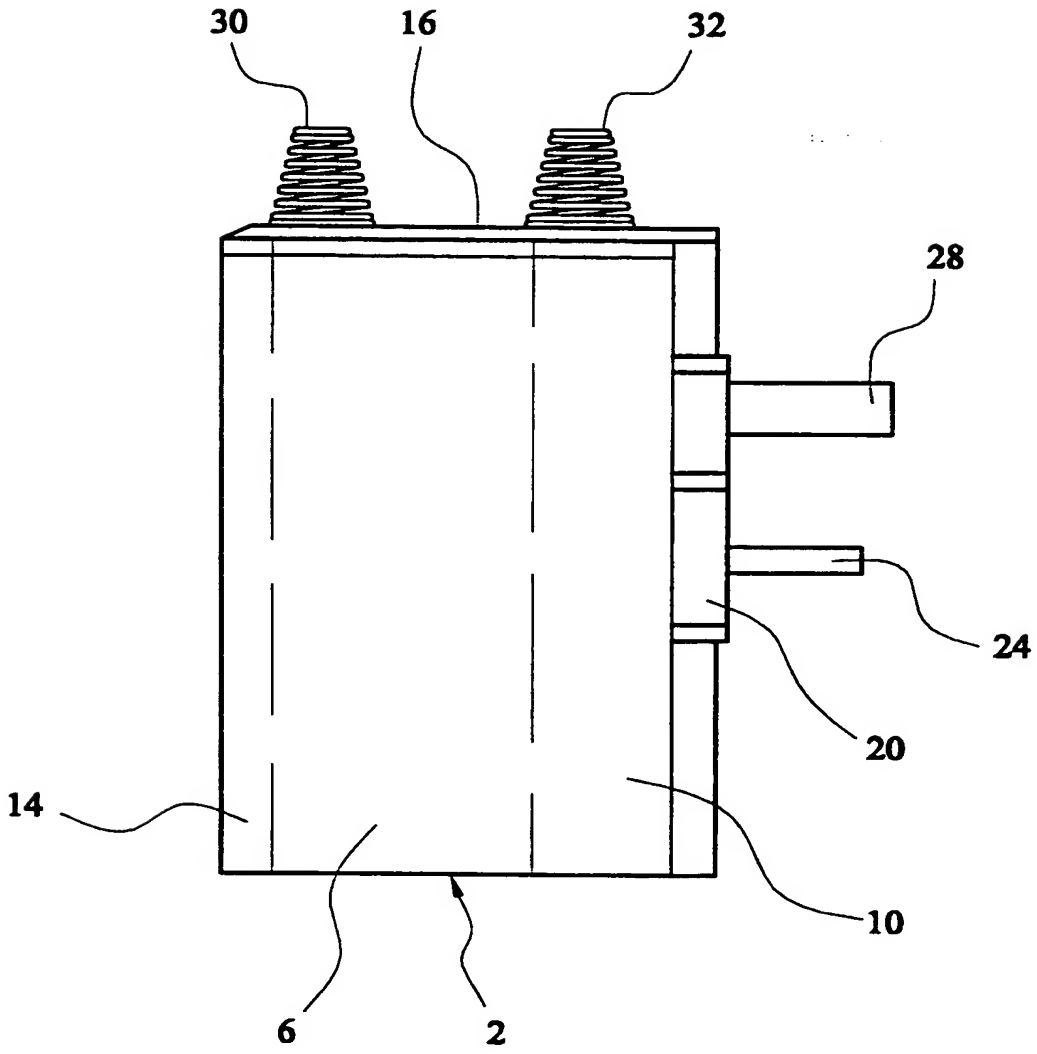


FIG. 2

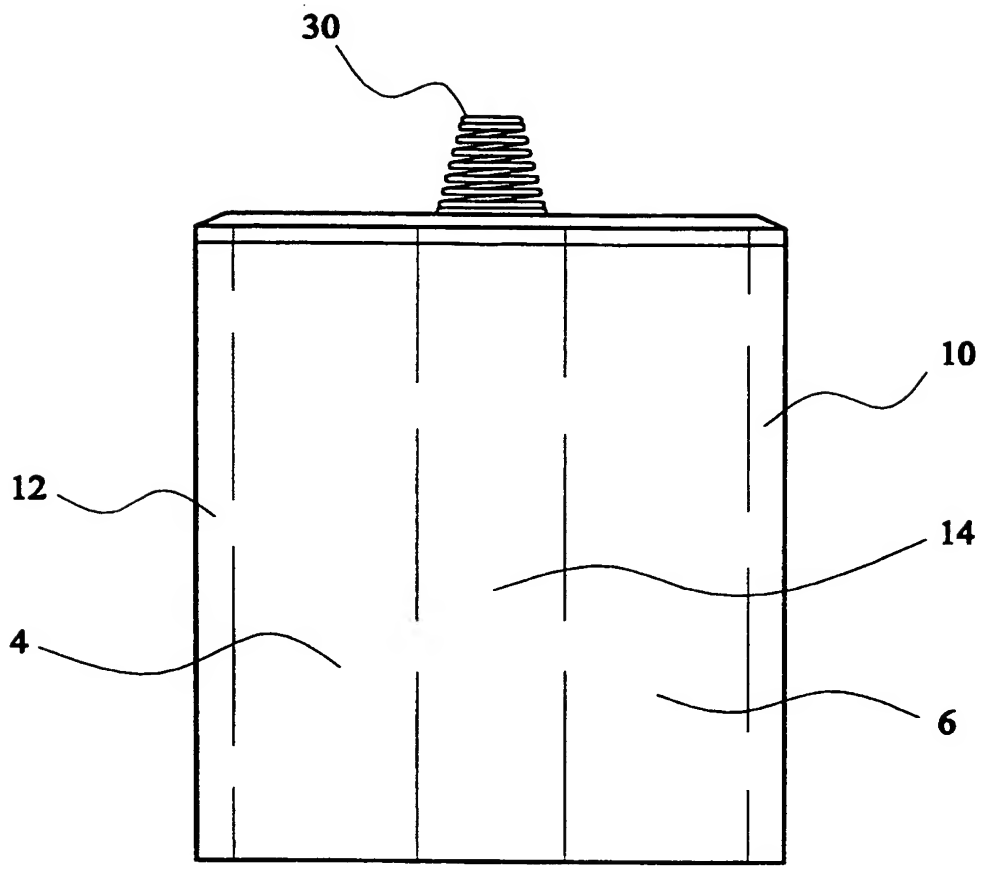


FIG. 3

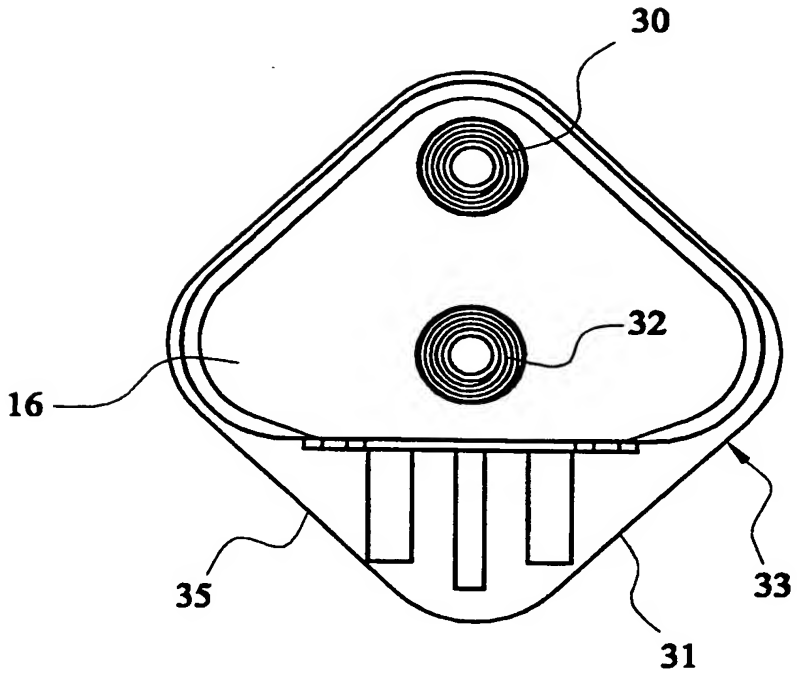


FIG. 5

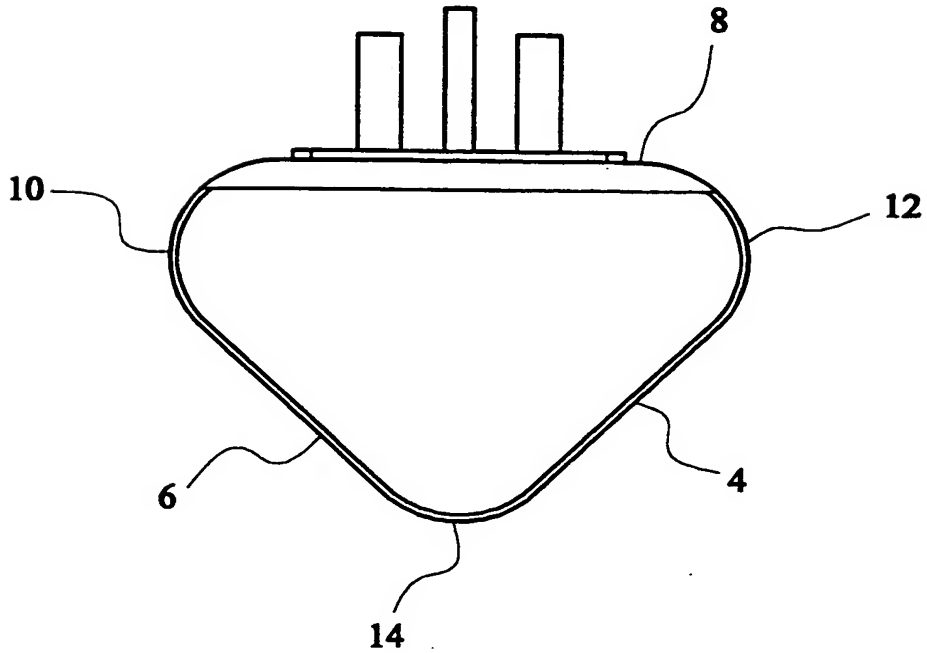


FIG. 4

CLAIMS

1. An integral battery and recharger comprising a battery housing, battery terminals and plug pins for location in a plug socket and operable to effect recharging of the battery when connected to an AC supply, the battery housing being generally designed to be received in a close fitting cavity of a battery powered device, wherein the part of the housing from which the plug pins project is designed to be sufficiently spaced, in use, from the walls of the said cavity to allow the plug pins which project therefrom to fully extend in the space provided between the said part and the said cavity.

2. An integral battery and recharger according to claim 1, wherein the housing is shaped so as to be securely locatable in the cavity in a manner which is independent of the pins.

3. An integral battery and recharger according to claim 1, wherein the ends of the pins extend, in use, as far as the cavity and contribute to the stability of the unit in the cavity.

4. An integral battery and recharger according to any preceding claim, wherein the ends of the pins provide two point stabilising contact, in use, with the cavity.

5. An integral battery and recharger according to any preceding claim, wherein the plug pins project outwardly from a side of the housing.

6. An integral battery and recharger according to any preceding claim, wherein the plug pins are fixed in

the same position with respect to the housing during recharging and during use of the battery in a battery powered device.

7. An integral battery and recharger according to any preceding claim, wherein the battery is designed for location in a generally four-sided cross-section elongate cavity.

8. An integral battery and recharger according to claim 7, wherein the cavity has a rectangular cross-section with bevelled angles.

9. An integral battery and recharger according to any preceding claim, wherein the housing has three sides in end section.

10. An integral battery and recharger according to any preceding claim, wherein the plug pins project outwardly perpendicular from the cavity spaced face of the housing.

11. An integral battery and recharger according to any preceding claim, wherein the positive and negative pins abut, in use, adjacent sides of the cavity respectively to thereby provide additional rotational and lateral stability for the battery within the cavity.

12. An integral battery and recharger according to any preceding claim, wherein two adjacent sides of the battery housing extend substantially at right angles to each other.

13. An integral battery and recharger according to claim 12, wherein the side from which the pins project extends at substantially 45° with respect to the said

adjacent sides to form the third side of a three sided battery housing.

14. A battery powered device comprising a battery cavity for receiving a battery housing and a battery located in the said cavity, the battery being according to any of claims 1-13.

15. A method of using and recharging a battery located in a battery powered device comprising the steps of
using the said battery powered device in battery powered mode;
removing the battery having integral plug pins projecting therefrom from the battery powered device;
and plugging the said plug pins into a power source socket for recharging the said battery wherein the position of the plug pins are continuously fixed in the same position with respect to the battery housing during the aforementioned steps.

16. A battery and recharger as hereinbefore described with reference to the accompanying drawings.

17. A method of using and recharging a battery as hereinbefore described.

14

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
DPW/EM/S201		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/02608	07/07/2000	24/07/1999
International Patent Classification (IPC) or national classification and IPC H01M10/46		
Applicant UNI-LITE INTERNATIONAL LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 10 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
23/01/2001	19.11.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Tasiaux, B Telephone No. +49 89 2399 2555

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/02608

I. Basis of th rep rt

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-12	as originally filed				

Claims, No.:

1-15	as received on	07/08/2001	with letter of	02/08/2001	

Drawings, sheets:

1/4-4/4	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   ☐ the language of publication of the international application (under Rule 48.3(b)).
   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.
   ☐ filed together with the international application in computer readable form.
   ☐ furnished subsequently to this Authority in written form.
   ☐ furnished subsequently to this Authority in computer readable form.
   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:
   ☒ the claims, Nos.: 16-17

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

   ☐ the entire international application.

   ☒ claims Nos. 14-15.

because:

   ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

   ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
   see separate sheet

   ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

   ☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

   ☐ the written form has not been furnished or does not comply with the standard.

   ☐ the computer readable form has not been furnished or does not comply with the standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and xplanations supp rting such statement

1. Statement

   Novelty (N) Yes: Claims 1-15

	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-15
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

R It m III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

These claims make illegal references to the figures (Rule 6.2(a) PCT) and do not include any well defined features (Art. 6 PCT).

It is advised to drop these claims when entering the regional phase.

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive st p or industrial applicability; citations and explanations supporting such statem nt

This report as been drafted as if the remarks made in Section VIII of this report had been taken into account.

Claim 1 : None of the documents cited in the International Search Report discloses the arrangement of a cavity and an integral battery and recharger with the features as recited in Claim **1** and taking account the remarks of Section VIII.1. Many batteries with integral battery charger are known in the art, as shown by example in US-A- 4 191 917 . However, the claimed arrangement involves an inventive step, since none of the available documents suggests to mount a generally triangular-shaped battery in a generally square-shaped cavity, with two walls of the battery housing being disposed parallel to adjacent walls of the cavity and with the battery recharger plug pins protruding from the third wall of the battery housing, extending parallel to a diagonal axis of the generally square-shaped cavity and abutting against opposite cavity walls, thereby providing a secure and stable mount for the battery in the cavity whilst allowing an easy removal of the battery for being recharged. Claim 1 meets therefore the requirements of Art. 33(2), 33(3) PCT.

Claims 2-12 : These claims contain miscellaneous features of particular embodiments of the device claimed in Claim **1**. They also meet the requirements of Art. 33 (2), 33(3) PCT.

Claim 13 : is actually a claim containing all structural features of claim 1 as well as some

additional functional features resulting actually from the said structural features. Therefore, it also meets the requirements of Art. 33 (2), 33(3) PCT.

Claim 13 : is a method of using and recharging the battery mounted in a cavity according to the arrangement claimed in Claim 1. Therefore, it also meets the requirements of Art. 33 (2), 33(3) PCT.

Re Item VII

Certain defects in the international application

Defects to be fixed when entering the regional phase :

1. To meet the requirements of Rule 6.3(b) PCT, the independent apparatus claim should be properly cast in the two part form, with all those features which in combination are part of the prior art (see document **D1**) being placed in the pre-amble.

2. Documents D1 to D3 should be referred to in the description as relevant prior art and the relevant background art disclosed therein is to be indicated (Rule 5.1(a)(ii) PCT).

3. Reference signs in parentheses should be inserted in the claims to increase their intelligibility (Rule 6.2(b) PCT). This applies to both the preamble and characterising portion of all claims, independent or dependent.

4. In the description, pg. 11, 2nd §, the formulation "the specification thereof being specifically incorporated herein by reference" is contrary to the PCT Guide Lines II, 4.17. This formulation should be deleted from the description as well as the entire paragraph in which it appears.

5. The general statement in the description at page 12, last § is not clear, and when used to interpret the claims renders them also unclear, contrary to Article 6 PCT. This statement should therefore be deleted.

6. The description must be brought into conformity with the amended claims.

Care should be taken during revision, especially of the introductory portion including any statements of problem or advantage, not to add subject-matter which extends beyond the content of the application as originally filed, Article 34(2)(b) PCT.

In order to avoid further objections concerning Article 34(2)(b) PCT and to expedite the procedure, detailed indications concerning the locations where the features of each new claim had originally been disclosed should be supplied.

Re Item VIII

Certain observations on the international application

If new claims are filed when entering the regional phase, they should be amended taking into account the following remarks :

1. Claim 1 is not clear.

1.1 Firstly, the formulations "is designed to be ... to allow ..." are functional formulations, i.e. indicating the result to be obtained without providing the structural features necessary for achieving the desired result. Such formulations are not allowable since the person skilled in the art would have to employ an inventive step in order to find a solution to the problem posed.

Since these features are in fact the nucleus of the subject-matter to be protected, they have to be incorporated into Claim 1 and described in terms of structural details allowing to readily understand the solution to the stated problem (Art. 6 PCT).

1.2 Moreover, formulations such as "part of the housing ... designed so as to be sufficiently spaced from the cavity" or "the plug pins which project therefrom fully extending in the space provided between the said part and the said cavity" are unclear and not allowed under Art. 6 PCT, since they characterize the claimed device and/or parts thereof with features of items which are not part of the subject-matter designated to be protected.

Such formulations have to be dropped inasmuch as the subject-matter of Claim 1 is designated as an integral battery and recharger. The claimed apparatus must be described with detailed structural features which clearly and unambiguously define it per se.

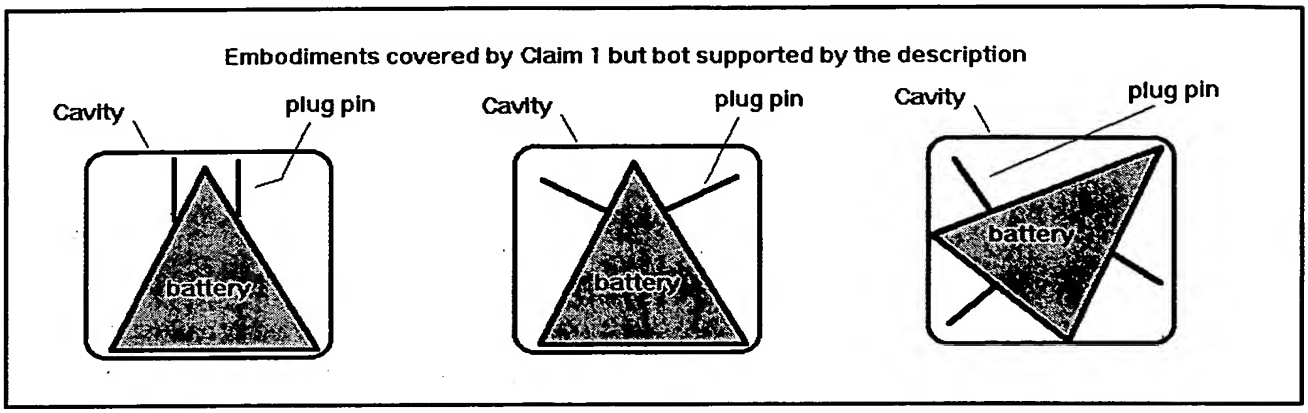
However, these formulations could be kept if the wording designating the subject-matter of Claim 1 would clearly and unambiguously state that the cavity is integral part of the subject-matter to be protected, e.g. by designating it as the *arrangement of a cavity and an integral battery and recharger.*

This is the solution that should be favoured in the present case since the features of (parts of) the integral battery and recharger depend on the features of the cavity. In this case Claim 12 will be redundant.

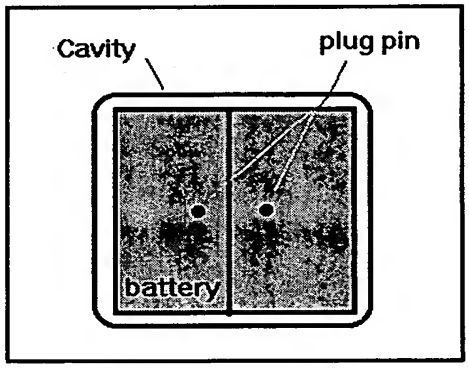
1.3 Claim 1 is also drafted in quite vague terms which include embodiments not at all supported by the description. By example, the fact that the projecting plug pins fully extend in the space provided between the part housing the projecting plug pins and the cavity does not exclude an embodiment wherein said part is in the form of a recess in the battery housing, as shown in D2. However, such an embodiment is not at all supported by the description.

Claim 1 should be drafted with enough structural details so as to clearly and unambiguously define the subject-matter to be protected and allowing to readily understand the solution to the stated problem.

In this respect, at least the respective orientation of the battery housing walls to the cavity walls as well as the orientation of the battery plug pins with respect to the battery symmetry axis and the cavity symmetry axis should be specified, so as to exclude from the scope of the claims the following embodiment (see drawing) which is not at all supported by the description :



1.4 The actual wording of Claim 1 does also not exclude the case of a generally triangular-shaped battery housing which is mounted with one of the triangular sides against the bottom of the cavity as shown here :



2. The objection under 1.1 applies to Claim 2 as far as the formulation "shaped so as to be ..." is concerned.

   Moreover, the wording of Claim 2 is quite obscure since no feature of the pins is defined with respect to which some independency is sought.

3. The objection under 1.2 applies also to Claims 3, 4, 7, 8, 9 as well.

4. The dependency of Claims 11 and 12 is to be renumbered taking into account the original claims that where dropped.

5. Claim 14 refers to a "battery as claimed in Claims 1-13". It should actually refer to the designated subject-matter of Claims 1-11, i.e. an "integral battery and recharger".

6. Method Claim 13 should make an explicit reference to the apparatus claims so as to ensure that all independent claims include the same set of essential features and to avoid repetition of wording as well as problems with respect to Rule 13(1) & (2)PCT.

CLAIMS

1. An integral battery and recharger comprising a battery housing, battery terminals and plug pins for location in a plug socket and operable to effect recharging of the battery when connected to an AC supply, the battery housing being generally designed to be received in a close fitting four-sided cross-section elongate cavity of a battery powered device, wherein the housing has three sides in end-section and wherein the part of the housing from which the plug pins project is designed to be sufficiently spaced, in use, from the walls of the said cavity to allow the plug pins which project therefrom to fully extend in the space provided between the said part and the said cavity.

2. An integral battery and recharger according to claim 1, wherein the housing is shaped so as to be securely locatable in the cavity in a manner which is independent of the pins.

3. An integral battery and recharger according to claim 1, wherein the ends of the pins extend, in use, as far as the cavity and contribute to the stability of the unit in the cavity.

4. An integral battery and recharger according to any preceding claim, wherein the ends of the pins provide two point stabilising contact, in use, with the cavity.

5. An integral battery and recharger according to any preceding claim, wherein the plug pins project outwardly from a side of the housing.

6. An integral battery and recharger according to any preceding claim, wherein the plug pins are fixed in the same position with respect to the housing during recharging and during use of the battery in a battery powered device.

7. An integral battery and recharger according to claim 7, wherein the cavity has a rectangular cross-section with bevelled angles.

8. An integral battery and recharger according to any preceding claim, wherein the plug pins project outwardly perpendicular from the cavity spaced face of the housing.

9. An integral battery and recharger according to any preceding claim, wherein the positive and negative pins abut, in use, adjacent sides of the cavity respectively to thereby provide additional rotational and lateral stability for the battery within the cavity.

10. An integral battery and recharger according to any preceding claim, wherein two adjacent sides of the battery housing extend substantially at right angles to each other.

11. An integral battery and recharger according to claim 12, wherein the side from which the pins project extends at substantially 45° with respect to the said adjacent sides to form the third side of a three sided battery housing.

12. A battery powered device comprising a battery cavity for receiving a battery housing and a battery located in the said cavity, the battery being according to any of claims 1-13.

13. A method of using and recharging a battery located in a battery powered device comprising the steps of using the said battery powered device in battery powered mode;

removing the battery having integral plug pins projecting therefrom from the battery powered device; and plugging the said plug pins into a power source socket for recharging the said battery wherein the position of the plug pins are continuously fixed in the same position with respect to the battery housing during the aforementioned steps.

14. A battery and recharger as hereinbefore described with reference to the accompanying drawings.

15. A method of using and recharging a battery as hereinbefore described.